Effect of Silver Compounds on Iron Oxidation in Bioleaching Processes

Sorur Sharoknyan*[1]; Jamshid Raheb[2]; Faramarz Moatar[1]; Javad Malakootikhah[3]; Mahmood Arabnezhad[4]

1-Department of Environment, Science and Research Branch, Islamic Azad University, Tehran, Iran

2-National Institute for Genetic Engineering and Biotechnology, Tehran, Iran

3- Faculty of New Science, Technologies University of Tehran, Tehran, Iran

4- Department of Microbiology, North Tehran Branch , Islamic Azad University, Tehran, Iran

asdm33@gmail.com

Background & Objectives: The extraction of metals from ores causes various environmental pollutions. Since Iran is located on the so-called 'copper belt' and holds a significant share of the world's copper mines and resources, reduction of pollution from these mines can have an important effect on the overall reduction of pollution.Copper processing methods include pyrometallurgy and hydrometallurgy. Pyrometallurgy is mainly used in high grade mines whereas hydrometallurgy process is used in lower grade mines.In low grade copper sulfide mines, hydrometallurgy processes are used which use a lot of energy to covert mineral deposits into oxide forms which are then leached using sulfuric acid, or are extracted using bioleaching process. In acidic leaching, a lot of environmental pollution is created.Bioleaching process is an environmentally-friendly methods which is mainly used in mines where the common physicochemical methods are not profitable.

Methods: In this study, we have tried to increase the efficiency of bioleaching process by adding silver in order to increase the popularity of this methods.For this purpose, initially the indigenous bacteria were separated from the ores and after adoption to silver nitrate, the bacteria were used in bioleaching tests.Three concentrations of silver nitrate were used for the bioleaching tests.

Results: The results were compared to cases where no bacteria and no silver compounds were used, which showed significant increase in copper extraction efficiency.In the next step, the optimum concentration of silver was used in the percolation column. In this stage, columns were set up for 'with bacteria and silver', 'with silver', 'with bacteria' and 'without bacteria and silver'.

Conclusion: Results show that the column with bacteria and silver produced the highest efficiency of extraction.

Keywords: Bioleaching; Silver Catalysis; Low-grade Copper Ores; Column Reactors